

# Designing a Smartphone Application to Document Patient Safety in Indonesia's Primary Healthcare Facilities

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**Abstract.** To achieve high-quality healthcare, patient safety must be regularly monitored and improved. Moreover, accreditation of healthcare facilities has been increasingly requested in recent years. In Indonesia, mobile applications can be a tool for community healthcare centers (Puskesmas) to assess their accreditation score, especially with respect to patient safety. The goal of this paper is to provide a prototype of a mobile application for self-monitoring elements of patient safety that uses an input-process-output-outcome scheme. We reviewed the Indonesian health minister's regulations for accreditation of Puskesmas and developed a checklist and scoring system for components of patient safety. Analysis and design of the system included the following aspects: 1) a checklist of patient safety assessment items; 2) a scoring system; and 3) recommended actions for Puskesmas that receive a low score. Future research would include testing of this application in real-world situations (in actual Puskesmas).

**Keywords:** *patient safety, Puskesmas, accreditation*

## 1 Introduction

### 1.1 Situation analysis

Patient safety is a cornerstone of healthcare service. With the implementation of national health insurance in Indonesia, Puskesmas have become the first point of contact with patients in delivering healthcare services. From patient registration to consultation, physical examination, and receiving medications—every step involves a risk to patient safety (Kolaborasi Bidang Pendidikan Proyek P4K, 2015). Medical and diagnostic errors are the most common types of incidents that occur in primary healthcare services, ranging between 7% and 52% (Makeham, Dovey, Runciman, & Larizgoitia, 2008). The cost associated with these medical errors can reach to 5.6% of total expenditures (Marchon & Mendes Jr., 2014).

Regulation of the Minister of Health Number 11 Year 2017 emphasized the importance of patient safety by implementing a safety standard, including seven steps for patient safety, nine health-related solutions for patients, and risk management. In addition, patient safety is part of the accreditation assessment process (Minister of Health Regulation No. 46, 2015). Therefore, every Puskesmas must apply patient safety principles consistently in providing its services.

The management of Puskesmas is the key to building a culture of patient safety. Nevertheless, management teams are often burdened with several tasks. This study aims to build a patient safety-oriented culture that can be easily understood and assessed by the staff of Puskesmas. In this era of technology, internet-based applications accessed through a computer or smartphone are gaining in importance. However, there is a limited number of studies involved in analyzing and designing applications for a patient safety program (Mira, Carrillo, Fernandez, Vicente, & Guilbert, 2016). If we can provide this technology to Puskesmas using a mobile application, the program can be implemented across all Puskesmas.

### 1.2 Objectives

Our objectives are as follows:

- 1) To provide a tool for collecting data on patient safety.
- 2) To provide a tool for monitoring and evaluating patient safety.
- 3) To record patient safety activities that can be used for accreditation purposes.

## **2. Methods**

### **2.1 Project target**

The target users of this mobile application are Puskesmas. Based on data from Profil Kesehatan Indonesia (2016), there are 340 Puskesmas in Jakarta and over 9,767 across the nation.

### **2.1 Problem identification**

Accreditation for a Puskesmas involves complex procedures and a number of administrative issues. Problems appear because people are not accustomed to documenting all of their activities. Therefore, when it is time to seek accreditation, people are busy preparing documents and have less time for routine healthcare services. In order to reduce the complexity of the administration process, we are developing an application that can be used for self-assessment and for tracking documents necessary for the accreditation.

Smartphones are used regularly by people throughout the day; therefore, a smartphone-based application would be acceptable and easy to use to upload and download documents as needed.

### **2.2 Diagram process: Input-Process-Output-Outcome**

Using the framework of input-process-output-outcome, we identify the following:

Input	: patient safety data as required in the accreditation form
Process	: data collection, categorization, organization (for tables and graphs)
Output	: information for monitoring and evaluation, and for accreditation
Outcome	: decision support system for ongoing monitoring and evaluation for accreditation

Based on Chapter 9 of the regulations specified by the Minister of Health for accreditation of Puskesmas, we identified several items related to patient safety that will be assessed during the accreditation process. These aspects comprise the foundation of the proposed smartphone-based application. We described the scenario in which people login, upload documents, make checklists, and/or download documents. To generate output, information on patient safety would be collected and would be used to partially complete the accreditation form. In the long run, this application could be used for the monitoring and evaluation of the accreditation process, particularly with respect to patient safety.

## **3. Discussion and Results**

### **3.1 Front page**

On the initial screen (Figure 1), users will login using their email. They can login as a Puskesmas or as clinic staff. Then, a short survey will be taken to get details about the characteristics of the user, such as their work area.

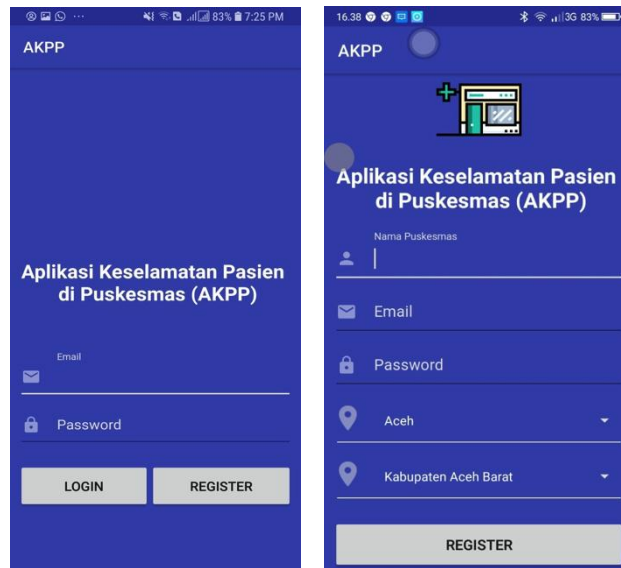


Figure 1. Front page

### 3.2 Elements of assessment

Based on the Regulation of Minister of Health Number 46 Year 2015, there are 58 components of patient safety assessment. The requirements for Puskesmas accreditation are specified in Chapter 9; information with regard to clinic accreditation is provided in Chapter 4. After login, the criteria page will appear, with several sub-chapters listed. The green light shows that the subchapter is in the “active” mode. The user can make a chapter inactive by clicking on the subchapter (Figure 2).

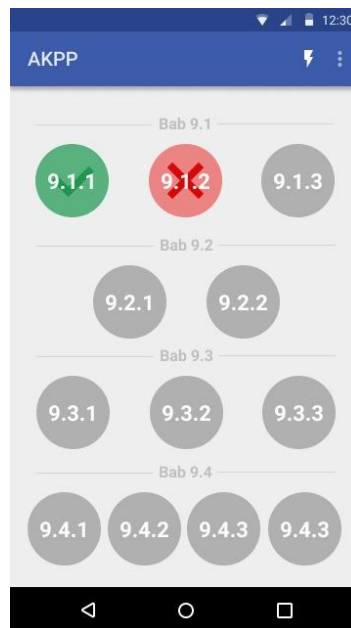


Figure 2. Elements of assessment

### 3.3 Scoring system

The required documents must be submitted to satisfy each criterion. The user can take photos of the documents or upload the documents directly. Based on the number of uploaded documents, the system will calculate the score. A score of 0 will be given if the user does not upload any documents; a score of 10 if they completed all the documents; and a score 5 if they only uploaded some of the required documents.

Based on the score, the users will receive information about the components they are lacking and how they can be improved.

### 3.4 Benefits and limitations

There are thousands of medicine and healthcare-related smartphone applications. However, most of them aim to assist in clinical practice, such as providing medical guidelines, screening algorithms, clinical pathways, medical reference tools, among others. Our application has several strengths compared to existing ones. It is the first application focused on accreditation. It is designed according to national regulations on patient safety. Furthermore, it is the first application with a checklist of documents required for accreditation. It is also a comprehensive application that will provide recommended solutions when the user has not achieved the minimum score to receive full accreditation.

However, we are aware that this application is still a prototype and that it has some weaknesses. Users should note that the application only assesses the requirements specified in Chapter 9 of the Ministry of Health Regulation regarding Puskesmas accreditation. The standard used for clinic accreditation is similar, but it cannot be applied to an independent practice. Additionally, the application is still document-based and cannot incorporate the assessment of a healthcare facility's processes. The scoring system simply counts the number of uploaded documents and compares that to the total number of required documents.

## 4. Conclusion

This is a pilot study to develop a mobile application for assessing patient safety in primary healthcare services. Users can independently assess their workplace using this tool, which is based on a Regulation of the Minister of Health. However, the application merely enables the monitoring and evaluation of patient safety and cannot be used as a basis for accreditation assessment.

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